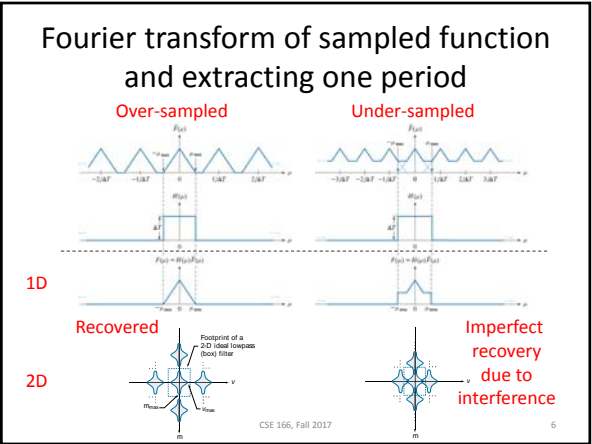
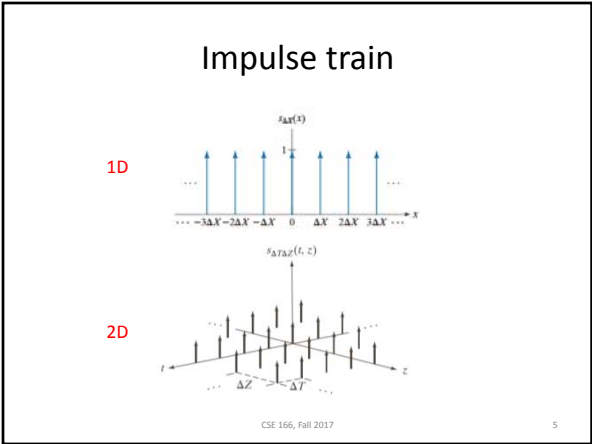
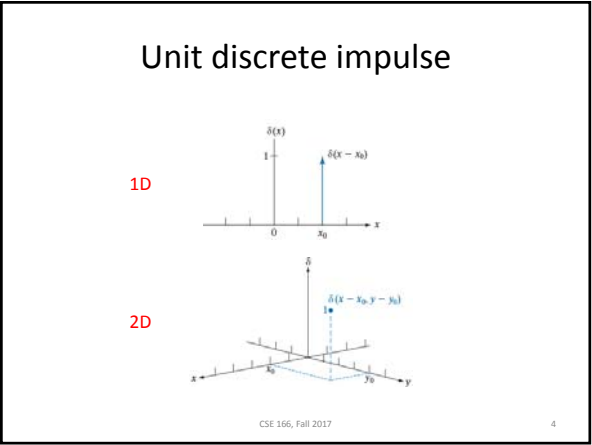
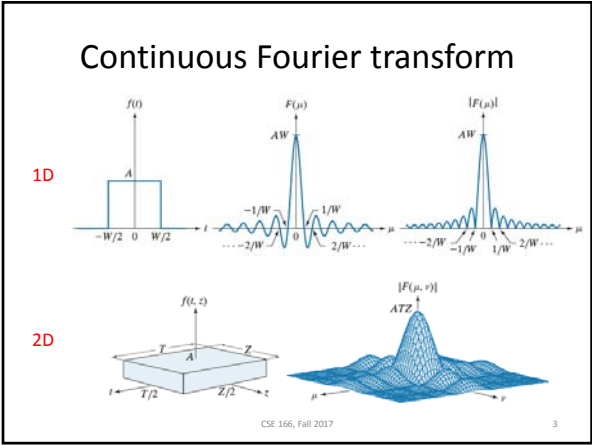
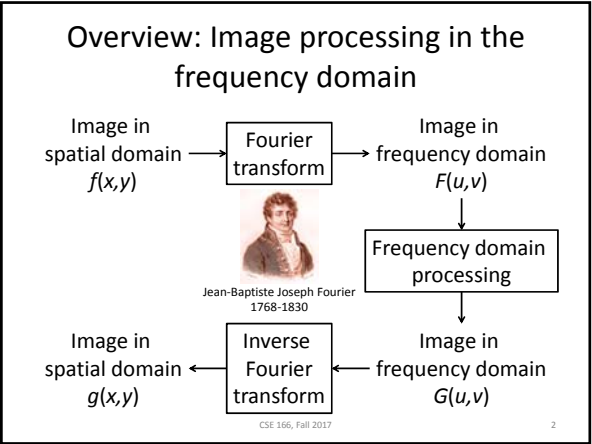
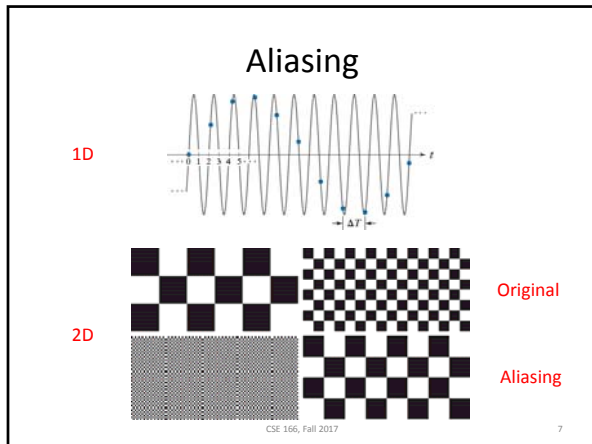


Filtering in the Frequency Domain

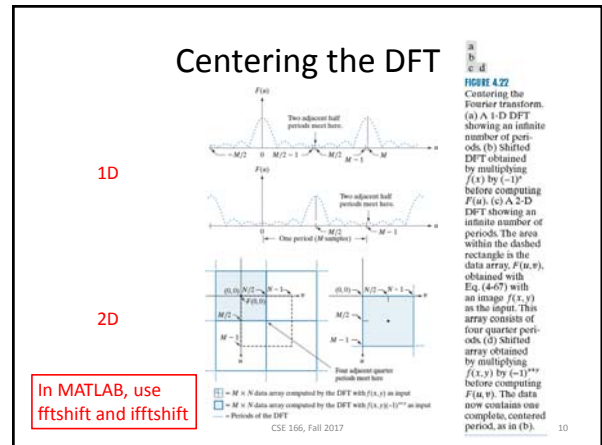
Image Processing
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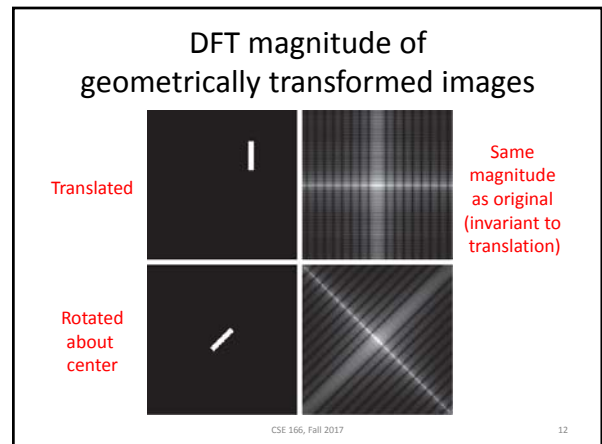
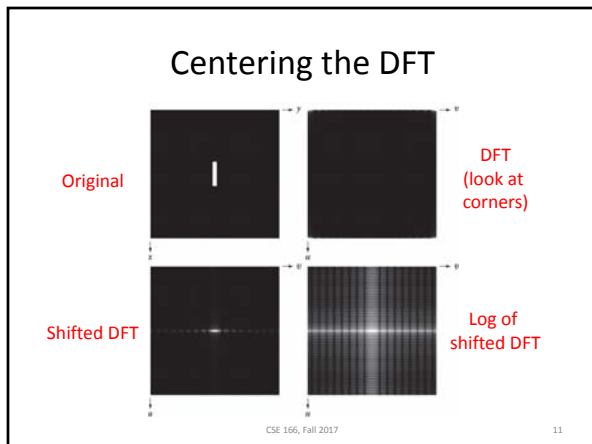


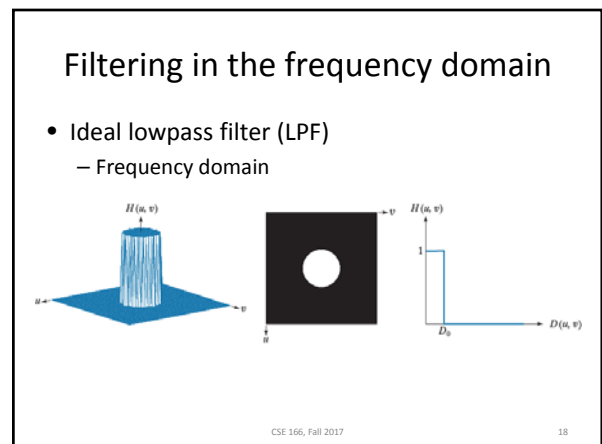
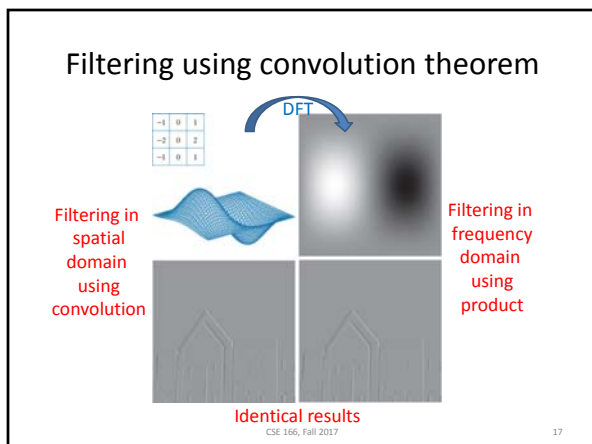
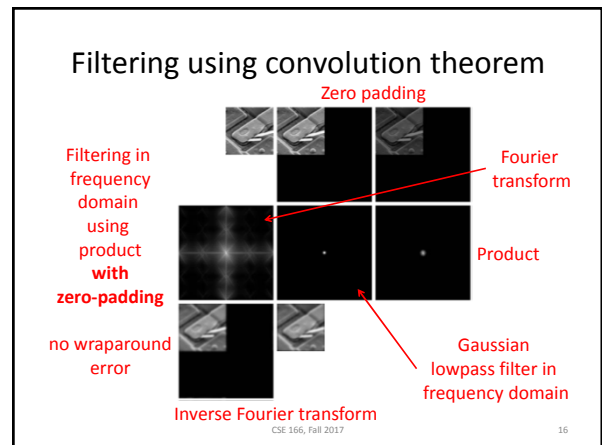
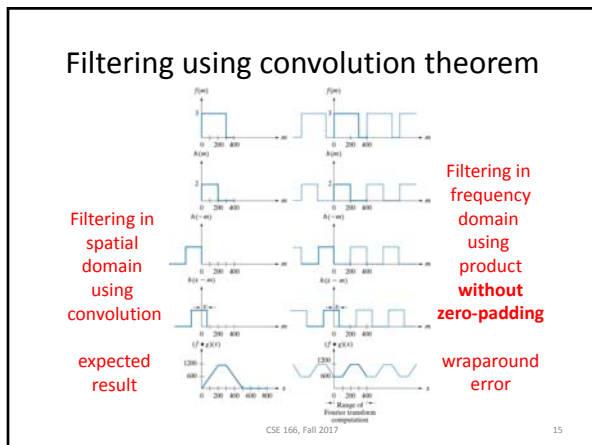
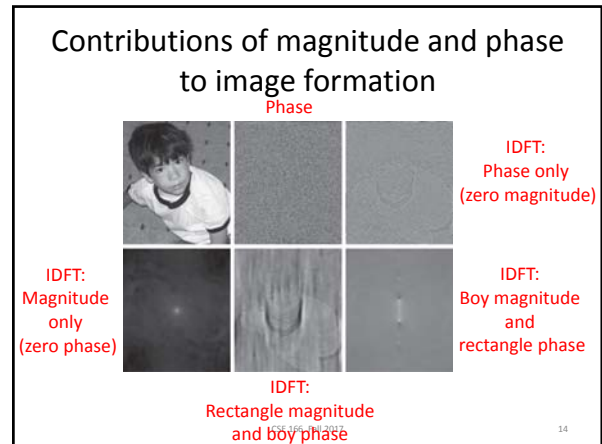
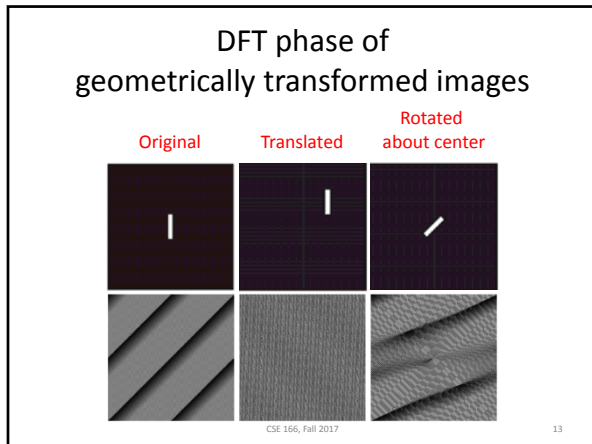
2D Discrete Fourier Transform

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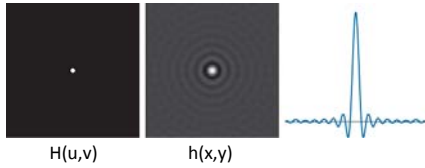
In MATLAB, use `fftshift` and `ifftshift`





Filtering in the frequency domain

- Ideal lowpass filter (LPF)
 - Spatial domain

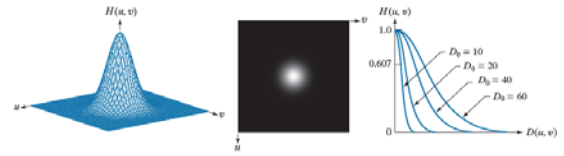


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Filtering in the frequency domain

- Gaussian lowpass filter (LPF)

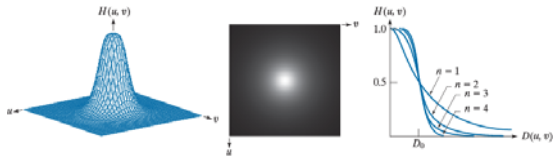


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Filtering in the frequency domain

- Butterworth lowpass filter (LPF)



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Filtering in the frequency domain



Ideal LPF

Gaussian LPF

Butterworth LPF

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Example: character recognition

Historically, certain computer programs were written using only two digits rather than four to define the applicable year. Accordingly, the company's software may recognize a date using "00" as 1900 rather than the year 2000.



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Gaussian LPF joins broken characters

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Highpass filter (HPF) Frequency domain

Ideal HPF



Gaussian HPF

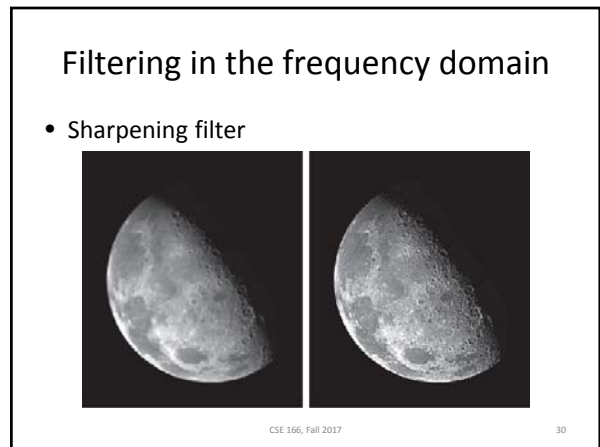
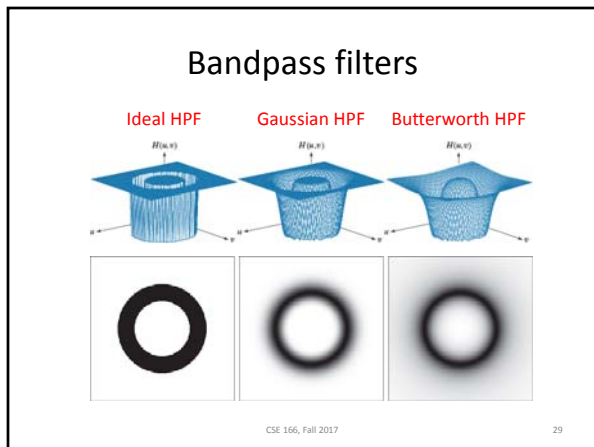
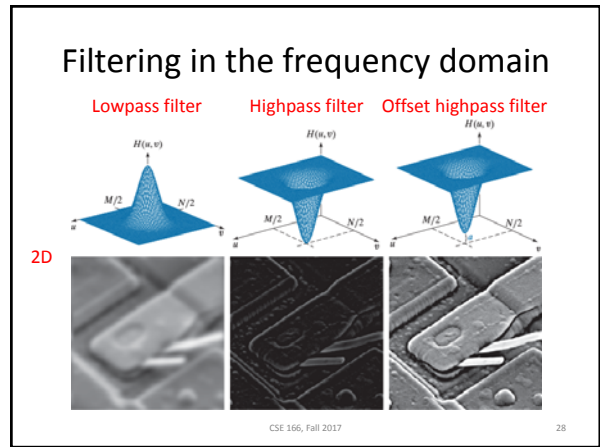
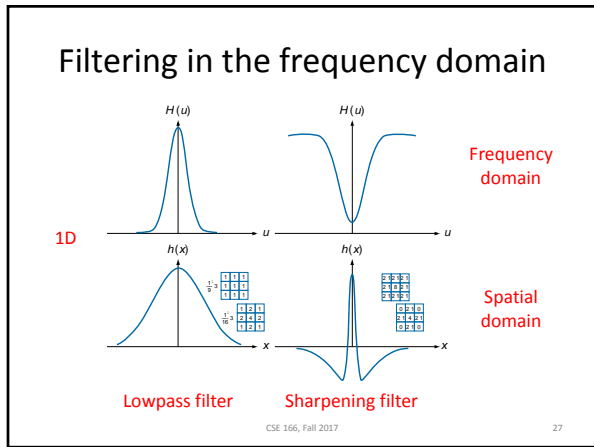
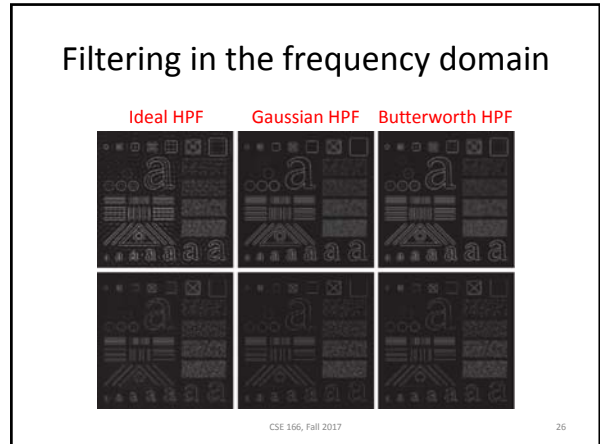
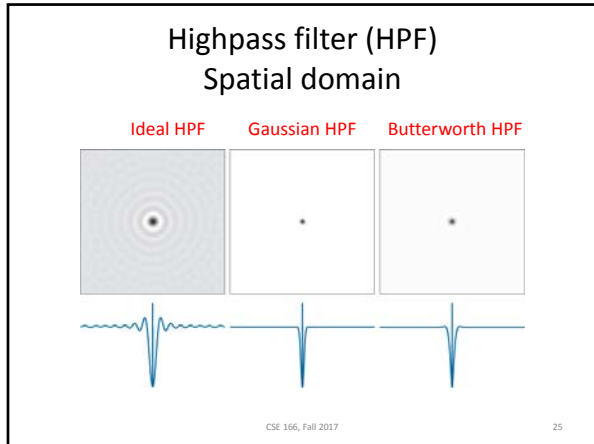


Butterworth HPF



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Overview: Image processing in the frequency domain

